GENERAL NOTES.

BOTANY.[1]

AN INSTANCE OF THE PHYSIOLOGICAL VALUE OF TRICHOMES.—The tissues of nascent organs are thin-walled, have a relatively large amount of protoplasm, and are gorged with nourishing sap. While in this condition they possess no air passages or cavities, and the stomata are consequently incapable of performing their function —they can no more "breathe" than can an animal with its lungs full of water. This formative period in the life of the tissues, however, is one in which a rapid supply of oxygen is required to carry on the metastatic changes incident to growth. This need is supplied by greatly increasing the surface of the organ bathed by the air, allowing a greater transfusion of oxygen through the uncuticularized surface walls. The expansion is secured by means of innumerable slender trichomes.

These trichomes are thus seen to be a provision for increasing the absorbing surface, to the end that abundant material may be supplied for metastasis.

As the tissues mature, the intercellular spaces beneath the stomata with their extensions ramifying throughout the organ become empty of sap and allow of the free circulation of air, while the cuticle becomes nearly or quite impervious. The oxygenation of the tissues is then more readily effected through internal communication; the hairs therefore disappear or are replaced by those serving a different purpose.—*J. C. Arthur.*

THE ARRANGEMENT OF FIBROUS ROOTS.—A few years ago, in harvesting about fifty bushels of beets of several varieties, my attention was drawn to a peculiarity in the arrangement of the fibrous roots of which till then I had been unaware. While the greater part of the beet was nearly or quite bare of rootlets these were very numerous and closely clustered in two vertical bands on opposite sides of the main root. Each band covered, say, one-tenth of the entire circumference, more or less. Later I observed just such an arrangement of the rootlets of turnips. But this year I have seen some turnips with the fibers in simple rows as in carrots and parsnips. In these last the rootlets are in vertical (or now and then somewhat spiral) rows. The number of rows seems to be always four, but so situated as in some degree to correspond with the *two bands* in beets and turnips; that is, the rows are not exactly equidistant, but are, as it were, arranged in two pairs on opposite sides of the main root, and yet so nearly equidistant that it is sometimes difficult to say which two constitute a pair. The intervals between the rows are commonly in the ratio of 5 to 7, or on a cross section the lines joining the rows would form a parallelogram whose sides would be about as 5 to 7.

The rootlets of carrots differ from those of turnips and beets in

[1]Edited by PROF. C. E. BESSEY, Ames, Iowa.

being thickened towards their base and this spreading laterally so as to give the surface of the carrot somewhat the appearance of having rings of growth. Furthermore these fibers instead of spreading out into the ground seem to hug the main root and are turned commonly to one side as if the carrot had been twisted in the pulling. Sometimes on the same root they are turned both ways, and generally or always more or less downward.

The rootlets of parsnips are distributed much as those of carrots, somewhat thickened at base, but generally much longer and more spreading and branching. They penetrate more deeply into the soil too and hence the difficulty of digging them. The rows of fibers seem to form a longer parallelogram than those of carrots, the sides being about as 4 to 7.

The rootlets in *curled dock (Rumex crispus)* are plainly in three rows (except in one forked root the larger branch of which had four distinct rows). Swamp dock *(R. verticillatus)* has the main root much divided, but the fibers of these divisions are mostly in fours, the rows perhaps not quite so regular as the three rows of the curled dock, still plainly to be distinguished.

The roots of evening primrose *(Œnothera biennis)* have rather large rootlets very plainly in three vertical rows.

I designed to make observations on other roots, but the cold weather has come on and frozen the ground.—*Charles Wright, Wethersfield, Conn., Dec.* 1881.

The Royal Gardens at Kew.—From the *Gardener's Chronicle* we learn that the Report on the progress and condition of the Royal Gardens at Kew, for the year 1880, has just been issued. Pending its receipt, the following will be found of interest. The number of visitors during the year amounted to very nearly three quarters of a million (723,681), the highest number for one day being 61,831. In the plant houses of the Botanic Gardens the palms have been entirely re-arranged owing to their crowded condition. In this department more space is urgently needed. The Arboretum suffered much from the frosts and gales of the winter of 1879–80. Curiously a number of Californian species suffered greatly from the inclemency of the weather; thus *Pinus insignis, P. muricata, P. sabiniana* and *Abies bracteata* were all more or less injured. *Pinus Elliottii* was also injured.

There are now no less than 220 species and varieties of Oaks grown in the Arboretum; 24 of Chestnuts, 34 of Beeches. A catalogue is in preparation "which will give the names of the principal species and varieties, with their native countries and synonyms." Such a catalogue from such a source can not fail to be of the highest value to botanists the world over, and its appearance will be looked for with interest by all.

The important economico-botanical collections from the India Museum at South Kensington were transferred to Kew during

the year 1880. This consisted of an immense quantity of material, from which the Kew authorities selected suites of specimens. Thus of rice alone "there were about two thousand samples, from the most widely distributed districts of India, and weighing in the aggregate about three tons. Every one of these was carefully examined and compared, and a series was separated showing every type of variation to which Indian rice is subject. The amount of this variation in form, color and texture is almost inconceivable, and the trouble and expense which must have been involved in the accumulation of the specimens, is amply justified by the clearness with which this fact is now brought out. In form the individual rice-grains vary from elongated to ovoid, in texture from translucent to pearl white opacity, in color from white to pink, brown, mottled, and even black."

In the Herbarium Dr. M. C. Cooke's services have been secured. He has undertaken the arrangement of the collections of thallophytes, especially of the fungi, "which, owing to the press of work in keeping the Phanerogams and Ferns constantly worked up, have been somewhat neglected." This latter announcement will be received with gratification by the many students of fungi in this country and England.

A GENERAL INDEX TO THE JOURNAL OF BOTANY.—James Britten announces a "General Index to the *Journal of Botany*," from its beginning to the end of Volume XX, to be published at six shillings (about $1.50) per copy, provided that a sufficient number of subscriptions are received. The importance of this index to all botanists, even in cases where complete sets of the Journal are not possessed, is so great that it is to be hoped that many orders will be sent from this country. Orders should be addressed to West, Newman & Co., 54 Hatton Garden, E. C., London, England. As Volume XX, will not be completed until the end of the year 1882, the index will not appear for a year or more.

BENTHAM ON GRAMINEÆ.—George Bentham read an important paper on the Gramineæ before the Linnean Society at its meeting November 3, 1881. He recognizes fourteen tribes which he disposes under two sub-orders, or families as follows:

A. PANICEÆ.	*B.* POACEÆ.
Tribe 1. Paniceæ,	Tribe 7. Phalarideæ,
" 2. Maydeæ,	" 8. Agrostideæ,
" 3. Oryzeæ,	" 9. Isachneæ,
" 4. Tristegineæ,	" 10. Aveneæ,
" 5. Zoysieæ,	" 11. Chlorideæ,
" 6. Andropogoneæ,	" 12. Festuceæ,
	" 13. Hordeæ,
	" 14. Bambuseæ.

BOTANICAL NOTES.—A fine full-page cut of a beautiful aroid (*Taccarum Warmingianum* Engl.), recently introduced into English gardens from Brazil, is given in a late number of the

Gardener's Chronicle. The leaf which is pinnatified, is from two to two and a half feet wide, and is borne upon a thick petiole between three and four feet long. The spathe, fifteen inches long, and borne upon a scape eight inches high, is of a brown coppery tint inside mottled with green, while the spadix is of a pale pink color. It will doubtless prove to be a valuable acquisition to our list of ornamental plants.——Rev. M. J. Berkeley describes a new parasite upon the lilac in the *Gardener's Chronicle.* It is evidently one of the Peronosporeæ, and is named by Mr. Berkeley, *Ovularia syringæ.* The conidia (acrospores) are large and ovoid, and occur singly on the ends of the hyphæ which protrude through the stomata. The parasite "produces large brown patches, sometimes occupying almost the whole of the leaf." Has this yet appeared in this country?——A leaf of the giant water lily *(Victoria regia)* growing in Lake Nuna in Peru is recorded by Paul Marcoy in the *Wiener Illustrirte Gartenzeitung* as having a circumference ot 24 feet 9¼ inches, and weighing between 13 and 14 pounds. One of the flowers measured 4 feet 2 inches in circumference, and weighed three and a half pounds. The outer petals were nine inches in length.——Dr. Vasey in the December *Botanical Gazette* describes three new species of grasses, viz: *Melica Hallii* from Colorado and the Great Plains of British America; *Sporobolus Jonesii* from Soda Springs, California, and *Poa purpurascens* from Oregon, and the Yellowstone region.—— In the same journal some one under the pseudonym of "Emesby" puts in a plea for Systematic Botany, or rather, it would appear, for what has been called Analytical Botany, as opposed to histological and physiological Botany. The writer apparently places a higher value upon the "identification" of a few plants, or the finding of a "new species" than upon that study of the structure and function of plants which alone can enable us to understand them *as living things.* His ideal botany is apparently one which culminates in the study and description of species!——M. Lechantier read a paper recently before the Academy of Sciences, Paris, upon the modifications in the composition of plants preserved in silos. Indian corn and clover lost a little of their nitrogenous matter; but the loss of glucosides was much greater; the chief loss being now in the glucose and sugar group, now in the starch and cellulose. Fatty matter, on the other hand, increased.——Part 1 of the "Transactions of the Massachusetts Horticultural Society" for 1881, has just appeared. It contains in addition to much of interest to horticulturists, many lists of trees, shrubs and other plants interesting to the botanist also.—— Figures and popular descriptions of the Short-leaved Skullcap *(Scutellaria brevifolia)* from Texas, and two fine species of Dahlia *(D. lutea* and *D. glabrata),* now rapidly coming into cultivation, are given in the December *American Agriculturist.*——Good figures of *Chara baltica* Bruz., var, *affinis* Groves, and *C. contraria*

Kuetz. accompany "Notes on British Characeæ" by H. and J. Groves in the December *Journal of Botany*.——The two delayed plates illustrating a paper on *Cinchona Ledgeriana* (from Bolivia), by Henry Trimen in the November *Journal of Botany*, appear in the December number. They are excellently done.

ZOOLOGY.

IS THE HUMAN SKULL BECOMING THINNER?—If the doctrines of evolution are true, and the evidence supporting them is of a convincing character, questions relating to the operation of the laws by which improvement or degradation results, become of particular importance when applied to the human race, and it is a matter of serious inquiry whether, under the altered conditions of civilization, causes may not be at work which operate to the disadvantage of the whole organism, by detracting from the efficiency of a part?

According to the theory as expounded by Darwin and others, we have the tendency of all organisms to accommodate themselves to their environment, and to adapt themselves to altered circumstances within certain limits, this principle of adaptation in cooperation with heredity, or the tendency of the offspring to inherit the characteristics of its progenitors, are made to account for much of the otherwise inexplicable phenomena with which we are surrounded.

Now according to this doctrine, an organism is endowed with ability to succeed amid certain surroundings—in the higher vertebrates, for example, we have the framework of bone, with all its beautiful applications of the principles of mechanics, so arranged as to prevent to a great extent injury of the important organs, and when we come to the brain, we find it enclosed in a rigid covering, capable of resisting a considerable degree of violence without being fractured, and evidently intended to protect the delicate organ it contains.

If we accept the tenets of evolutionists, a race adapted to certain circumstances, will, if those circumstances be altered, become modified in a corresponding degree, and retrogression may result as well as improvement, and this modification may be confined to a certain part or organ. Let us consider, therefore, what forces have exerted their influence upon this casket of the brain.

First, natural selection in the case of those creatures that engaged in fierce combats, would tend to eliminate those individuals with frail craniums, and as man comes within the category of belligerent creatures, when barbaric warfare, and the dangers of the chase were common occurrences, natural selection would of course exercise a powerful influence in maintaining a standard of cranial strength. Then, too, in the presence of repeated violence, adaptation would undoubtedly provide a suitable armor for this delicate and important organ. And as it is difficult to conceive